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Docket No.: R2184.0075/P075
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BOARD OF PATENT APPEALS AND INTERFERENCES

In re Patent Application of:
Masajiro Iwasaki

Application No.: 09/559,255 Group Art Unit: 2672

Filed: April 27, 2000 Examiner: Motilewa A. Good-Johnson

For: PRESENTATION OF IMAGES RESEMBLING EACH OTHER

APPELLANT'S BRIEF

Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Dear Sir:

This is an appeal pursuant to 35 U.S.C. § 134(a) and 37 C.F.R. §§ 1.191 et seq., from the final rejection of claims 1-18 (all of the pending claims) of the above-identified application. This Brief is being submitted in triplicate. An appendix of claims is attached; the applicable fee ($330.00; 37 C.F.R. § 1.17(c)) is also attached. Please charge any deficiency in the fees associated with this paper to Deposit Account No. 04-1073. The Notice of Appeal was filed on December 23, 2003.

I. Real Party in Interest

The real party in interest in this appeal is Ricoh Company, Ltd. (the assignee of the application).

II. Related Appeals and Interferences

There are no appeals or interferences known to Appellant, his legal representative, or the assignee which will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

III. Status of Claims

Claims 1-18 are pending in the application. Claims 1-18 are rejected under 35 U.S.C. § 102 as being anticipated by Jain. As noted above, this is an appeal from the final rejection of claims 1-18.

IV. Status of Amendments

There has been no amendment subsequent to the July 25, 2003 final Office Action. A Request for Reconsideration was filed on October 27, 2003. A personal interview was conducted on December 18, 2003. No agreement was reached during the interview.

V. Summary of Invention

The present invention relates to a method of displaying images that resemble each other. According to one aspect of the invention, image features are extracted from the images (page 13, line 19 – page 14, line 8), a feature space (Fig. 2) is divided into sub-spaces (page 14, lines 20-23), and a display space (Fig. 7) is divided into a plurality of divided spaces. The features (A, C1, etc.) that are extracted may be histogram features, edge features, texture features, etc. (page 13, lines 21-23), and the feature space (Fig. 2) is made up of the image features (A, C1, etc.).[1]

The feature space (Fig. 2) is divided in such a way as to cause the sub-spaces to have a hierarchical structure, such that a tree structure (Figs. 3-5) having the sub-spaces as nodes thereof is generated (page 17, lines 6-17). The divided spaces of the display space (Fig. 7) are caused to correspond to the respective sub-spaces of the feature space, by taking into account the tree structure. Thus, according to this aspect of the invention, the images (the ones whose features were extracted) are displayed in the divided spaces of the display space, such that the images displayed in one of the divided spaces belongs to the corresponding sub-space of the feature space.

According to another aspect of the invention, the step of dividing the feature space includes a step of generating clusters having a circle shape by applying a clustering method recursively (page 15, line 1 – page 16, line 22; page 17, lines 10-12).

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[1] Although specific references to the drawings and specification are provided herein for illustrative/exemplary purposes pursuant to 37 C.F.R. § 1.192(c)(5), the claimed invention should not be limited to the preferred embodiments. The claimed invention is defined in the respective claims.

The clustering process may include the steps of: obtaining a distance between a feature and a cluster closest to the feature with respect to each one of the features; selecting a feature successively in an ascending order of the distance; obtaining an increase in a radius of each cluster such that each cluster contains the selected feature; and making the selected feature belong to a cluster that has the smallest radius increase (page 16, lines 11-14).

According to another aspect of the invention, the display space is divided, in a first dimension/direction, into as many divided spaces as there are nodes immediately under a given node in the tree structure. Then a new given node is selected, from the next node level, and then the dividing step is repeated, but in a second dimension/direction (page 18, lines 19+; Figs. 6A-6C). Extra spaces may be provided between the divided spaces to represent gaps between the nodes (page 22, lines 10+; Figs. 9A and 9B). Moreover, the sizes of the divided spaces may be adjusted to be proportional to (1) the numbers of image features belonging to the respective nodes and/or (2) the sizes of the sub-spaces corresponding to the nodes (page 21, line 19+).

The present invention also relates to a computer-readable medium MM (Fig. 11) having a program, with certain program code, embodied therein for causing a computer to create a display screen image (Fig. 7) (page 24, lines 8+). The present invention also relates to a display device (Fig. 1). The device includes a memory MM which stores a program, and a CPU which executes the program. The present invention also relates to a medium for causing a computer to create a display screen image for displaying items that resemble each other. The items may be, for example, images or documents (page 24, line 23 – page 25, line 3).

VI. Issues

Should the rejection of claims 1-18 under 35 U.S.C. § 102 as being anticipated by Jain be reversed?

VII. Grouping of Claims

The claims should not stand or fall together. The reasons why the claims are believed to be separately patentable are set forth in the Argument section of this Brief.

VIII. Argument

Claims 1-18 are rejected under 35 U.S.C. § 102 as being anticipated by Jain. The rejection should be reversed.

Jain refers to a system for searching a database to find images that are similar to a referent. In operation, a human user/operator first selects three criteria (such as the three primary colors). The system ranks each image in the database according to each of the criteria. The system then displays the images such that they appear to be ordered according to the rankings in a three-dimensional space, with the coordinate axes of the display space corresponding to the three selected criteria, and with the referent located at the origin [0, 0, 0].

Where the first selected criteria are the three primary colors (red, green and blue), then the images whose red characteristics are similar to those of the referent are shown close to the origin in the direction of the "red" axis, whereas the images whose

red characteristics are not similar to those of the referent are shown far away from the origin in the direction of the "red" axis. Likewise, the images whose blue and green characteristics are similar to those of the referent are shown close to the origin in the direction of the "blue" and "green" axes, respectively (column 8, lines 24-28; column 9, lines 35-46; column 11, lines 14-21; column 13, lines 55-65).

The user is then allowed to "navigate" the search results, by translating and rotating the observer coordinate system with respect to the coordinate system of the displayed images (column 25, lines 58-67). Such navigation is intended to make it appear as if the user is moving in three dimensions through a virtual gallery (column 8, lines 24-26; column 27, lines 24-30).

Then, the user is allowed to change one or more of the search criteria, to hopefully obtain a more useful display (column 6, lines 47-50; column 10, lines 48-54). For example, one of the first selected criteria may be changed to a characteristic of color distribution, structure or fine structure (column 24, lines 57+), and then the system starts over (column 11, lines 51-57). That is, the system ranks each image in the database according to the newly selected criteria, and creates a new display based on the new rankings, with the coordinate axes of the display space corresponding to the newly selected criteria (column 16, lines 30-34), and then the user can navigate the newly created display.

Claim 1

Claim 1 recites the step of "dividing a feature space . . . into sub-spaces having a hierarchical structure." This is an important aspect of the claimed invention.

Jain fails to disclose or suggest the step of "dividing a feature space . . . into sub-spaces having a hierarchical structure." Although the Examiner argues that the step is suggested in column 10, lines 35-41, of Jain, there is nothing in that passage, or anywhere else in Jain, about "dividing a feature space . . . into sub-spaces having a hierarchical structure."

Moreover, claim 1 recites the step of "generating a tree structure having the sub-spaces as nodes thereof." Jain fails to disclose or suggest the step of "generating a tree structure," much less generating a tree structure whose nodes are the sub-spaces that are divided from the feature space. In contrast to the claimed invention, Jain simply ranks images according to selected criteria (column 9, lines 35+; column 11, lines 14+).

Moreover, claim 1 recites the step of "dividing a display space into . . . spaces corresponding to the respective sub-spaces by taking into account the tree structure." Jain does not have the recited tree structure to take into account, nor does it have the recited sub-spaces. According to the claimed invention, the "sub-spaces" are divided from the feature space and have a hierarchical structure. The second dividing step of claim 1 (the step of dividing the display space) is not shown in Jain, Fig. 10. Jain does not disclose or suggest that its display is divided "by taking into account [a] tree structure," much less by taking into account a tree structure whose nodes are sub-spaces of a feature space, where the sub-spaces have a hierarchical structure.

Jain fails to disclose or suggest important aspects of the invention of claim 1. Therefore, the rejection of claim 1 should be reversed.

Claim 2

Claim 2 depends from claim 1 and says that the feature space dividing step includes "a step of generating clusters having a circle shape." Jain fails to disclose or suggest this important aspect of the claimed invention and the Examiner provides no meaningful explanation to the contrary. There is nothing in column 11, lines 1 and 2, of Jain about generating the recited "circle shape" clusters. For at least these reasons, the rejection of claim 2 should be reversed.

Claim 3

Claim 3 depends from claim 2 and says that the clustering method includes, among other things, the step of "making [a] selected image feature belong to a cluster that has the smallest radius increase." Jain appears to be unrelated to the subject matter of claim 3, and the Examiner provides no explanation to the contrary. Column 11, lines 35-50, of Jain contains the word "clustered," but only to characterize the appearance of images in the display, not as part of any clustering method like the one recited in claim 3. For at least these reasons, the rejection of claim 3 should be reversed.

Claim 4

Claim 4 depends from claim 1 and includes all the limitations of claim 1. In addition, claim 4 says that the display space dividing step includes, among other things, the step of "changing [a] selected dimension as a new node is selected as the given node from a next node level." Jain appears to be unrelated to the subject matter of claim 4, and the Examiner provides no explanation to the contrary. There is nothing in

column 6, lines 30-44, of Jain about changing a selected dimension for dividing a display space, nor is there anything in Jain about selecting a new node from a next node level. For at least these reasons, the rejection of claim 4 should be reversed.

Claims 5-8

Claims 5-8 each depend from claim 4, and they each recite aspects of the display space dividing step that are neither shown nor suggested by Jain. Claim 5 says that the step provides "extra spaces . . . [representing] gaps between . . . nodes." Claim 6 says that the divided spaces "have sizes proportional to numbers of image features belonging to the respective nodes." Claim 7 says that the divided spaces "have sizes proportional to sizes of the sub-spaces corresponding to the respective nodes." Claim 8 says that the sizes of the divided spaces "reflect numbers of image features belonging to the respective nodes and sizes of the sub-spaces corresponding to the respective nodes" (emphasis added). Jain fails to disclose or suggest any of these important features of the claimed invention.

In particular, there is nothing in column 27, lines 31-38, of Jain that calls for or suggests providing "extra spaces" representing gaps between "nodes." Recognizing that images may be grouped together in a display, after the display is created, is not the same as "provid[ing] extra spaces between . . . divided spaces such that the extra spaces represent gaps between . . . nodes," as recited in claim 5. With respect to claims 6-8, Appellant notes there is nothing in column 17, lines 1-24, or column 27, lines 39-67, of Jain about providing for or adjusting the sizes of divided spaces, as part of a step of dividing a display space into such spaces, as recited in claims 6-8.

Claim 9

Claim 9 recites a computer-readable medium having a program embodied therein for causing a computer to create a display screen image. Although claim 9 is not a method claim, it recites program code for performing steps generally like those discussed above in connection with claim 1. Jain fails to disclose or suggest program code for "dividing a feature space . . . into sub-spaces having a hierarchical structure," "generating a tree structure having the sub-spaces as nodes thereof," and "dividing a display space into . . . spaces corresponding to the respective sub-spaces by taking into account the tree structure," as recited in claim 9. Therefore, for at least these reasons, the rejection of claim 9 should be reversed.

Claims 10-16

Claims 10-16 depend from claim 9, and as such recite a computer-readable medium, not a method. The program code limitations of claims 10-16 are similar, however, to the method limitations of dependent claims 2-8. The Examiner does not provide any argument for rejecting claims 10-16 beyond those asserted against claims 2-8. Therefore, the rejection of claims 10-16 should be reversed at least for the reasons given above in connection with claims 2-8.

Claim 17

Claim 17 refers to a display device that has a memory and a CPU. The CPU executes a program stored in the memory to perform certain steps. The steps themselves are essentially the same as those recited in claim 1. The Examiner provides

no argument for rejecting claim 17 beyond those asserted against claim 1. The rejection of claim 17 should be reversed at least for the reasons given above in connection with claim 1.

Claim 18

Independent claim 18 recites a computer-readable medium having a program embodied therein for causing a computer to create a display screen image for displaying "items" that resemble each other. Although claim 18 refers to "items," not "images," such that claims 9 and 18 are not of the same scope, the limitations of claim 18 are otherwise generally like those of claim 9. The rejection of claim 18 should be reversed at least for the reasons given above in connection with claims 1 and 9. The Examiner provides no other arguments against claim 18.

IX. Conclusion

For at least the foregoing reasons, the rejection of claims 1-18 should be reversed.

Dated: March 16, 2004

Respectfully submitted,

By _____

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APPENDIX

1. A method of displaying images that resemble each other, comprising the steps of:

extracting image features from images;

dividing a feature space of the image features into sub-spaces having a hierarchical structure;

generating a tree structure having the sub-spaces as nodes thereof;

dividing a display space into a plurality of divided spaces corresponding to the respective sub-spaces by taking into account the tree structure; and

displaying the images in the plurality of divided spaces of the display space, such that any given one of the images displayed in one of the divided spaces of the display space belongs to one of the sub-spaces that corresponds to said one of the divided spaces of the display space.

2. The method as claimed in claim 1, wherein said step of dividing a feature space includes a step of generating clusters having a circle shape by applying a clustering method recursively.

3. The method as claimed in claim 2, wherein said clustering method includes the steps of:

obtaining a distance between an image feature and one of the clusters closest to the image feature with respect to each one of the image features;

selecting an image feature successively from the image features in an ascending order of the distance;

obtaining an increase in a radius of each cluster such that said each cluster contains the selected image feature; and

making the selected image feature belong to a cluster that has the smallest radius increase.

4. The method as claimed in claim 1, wherein said step of dividing the display space includes the steps of:

a) dividing the display space in a direction of a selected dimension, selected for a given node of the tree structure, into divided spaces as many as there are nodes immediately under the given node in the tree structure; and

b) repeating said step a) by changing the selected dimension as a new node is selected as the given node from a next node level.

5. The method as claimed in claim 4, wherein said step a) further provides extra spaces between the divided spaces such that the extra spaces represent gaps between the nodes.

6. The method as claimed in claim 4, wherein said step a) divides the display space such that the divided spaces corresponding to the respective nodes have sizes proportional to numbers of image features belonging to the respective nodes.

7. The method as claimed in claim 4, wherein said step a) divides the display space such that the divided spaces corresponding to the respective nodes have sizes proportional to sizes of the sub-spaces corresponding to the respective nodes.

8. The method as claimed in claim 4, further comprising a step of adjusting sizes of the divided spaces such that the sizes of the divided spaces corresponding to the respective nodes reflect numbers of image features belonging to the respective nodes and sizes of the sub-spaces corresponding to the respective nodes.

9. A computer-readable medium having a program embodied therein for causing a computer to create a display screen image for displaying images that resemble each other, said program comprising:

a program code for extracting image features from images;

a program code for dividing a feature space of the image features into sub-spaces having a hierarchical structure;

a program code for generating a tree structure having the sub-spaces as nodes thereof;

a program code for dividing a display space into a plurality of divided spaces corresponding to the respective sub-spaces by taking into account the tree structure; and

a program code for displaying the images in the plurality of divided spaces of the display space, such that any given one of the images displayed in one of the divided spaces of the display space belongs to one of the sub-spaces that corresponds to said one of the divided spaces of the display space.

10. The computer-readable medium as claimed in claim 9, wherein said program code for dividing a feature space includes a program code for generating clusters having a circle shape by applying a clustering method recursively.

11. The computer-readable medium as claimed in claim 10, wherein said clustering method includes the steps of:

obtaining a distance between an image feature and one of the clusters closest to the image feature with respect to each one of the image features;

selecting an image feature successively from the image features in an ascending order of the distance;

obtaining an increase in a radius of each cluster such that said each cluster contains the selected image feature; and

making the selected image feature belong to a cluster that has the smallest radius increase.

12. The computer-readable medium as claimed in claim 9, wherein said program code for dividing the display space includes:

a dividing program code for dividing the display space in a direction of a selected dimension selected for a given node of the tree structure into divided spaces as many as there are nodes immediately under the given node in the tree structure; and

a repeating program code for causing said dividing program code to repeat processing thereof by changing the selected dimension as a new node is selected as the given node from a next node level.

13. The computer-readable medium as claimed in claim 12, wherein said dividing program code further provides extra spaces between the divided spaces such that the extra spaces represent gaps between the nodes.

14. The computer-readable medium as claimed in claim 12, wherein said dividing program code divides the display space such that the divided spaces

corresponding to the respective nodes have sizes proportional to numbers of image features belonging to the respective nodes.

15. The computer-readable medium as claimed in claim 12, wherein said dividing program code divides the display space such that the divided spaces corresponding to the respective nodes have sizes proportional to sizes of the sub-spaces corresponding to the respective nodes.

16. The computer-readable medium as claimed in claim 12, further comprising a program code for adjusting sizes of the divided spaces such that the sizes of the divided spaces corresponding to the respective nodes reflect numbers of image features belonging to the respective nodes and sizes of the sub-spaces corresponding to the respective nodes.

17. A device for displaying images that resemble each other, comprising:

a memory which stores therein a program; and

a CPU which executes the program, wherein said CPU executing the program performs the steps of:

extracting image features from images;

dividing a feature space of the image features into sub-spaces having a hierarchical structure;

generating a tree structure having the sub-spaces as nodes thereof;

dividing a display space into a plurality of divided spaces corresponding to the respective sub-spaces by taking into account the tree structure; and

displaying the images in the plurality of divided spaces of the display space, such that any given one of the images displayed in one of the divided spaces of the

display space belongs to one of the sub-spaces that corresponds to said one of the divided spaces of the display space.

18. A computer-readable medium having a program embodied therein for causing a computer to create a display screen image for displaying items that resemble each other, said program comprising:

a program code for extracting item features from items;

a program code for dividing a feature space of the item features into sub-spaces having a hierarchical structure;

a program code for generating a tree structure having the sub-spaces as nodes thereof;

a program code for dividing a display space into a plurality of divided spaces corresponding to the respective sub-spaces by taking into account the tree structure; and

a program code for displaying the items in the plurality of divided spaces of the display space, such that any given one of the items displayed in one of the divided spaces of the display space belongs to one of the sub-spaces that corresponds to said one of the divided spaces of the display space.

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TRANSMITTAL OF APPEAL BRIEF

Docket No.
R2184.0075/P075

re Application of: Masajiro Iwasaki

Application No.	Filing Date	Examiner	Group Art Unit
09/559,255	April 27, 2000	M. Good-Johnson	2672

Invention: PRESENTATION OF IMAGES RESEMBLING EACH OTHER

TO THE COMMISSIONER OF PATENTS:

Transmitted herewith in triplicate is an Appeal Brief in this application, with respect to the Notice of Appeal filed: December 23, 2003 .

The fee for filing this Appeal Brief is 440.00 ($330 Appeal Brief and $110 Petition for Extension of Time).

[X] Large Entity [ ] Small Entity

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Dated: March 16, 2004

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